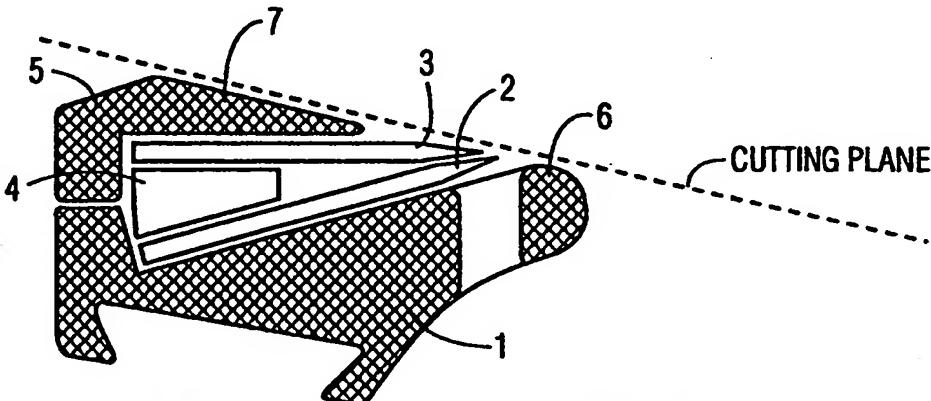


PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : B26B 21/00		A1	(11) International Publication Number: WO 94/26476 (43) International Publication Date: 24 November 1994 (24.11.94)
(21) International Application Number: PCT/US94/05238		2nd floor, 3082 Brighton, 13th Street, Brooklyn, NY 11235 (US).	
(22) International Filing Date: 11 May 1994 (11.05.94)		(74) Agent: DREYFUS, Edward; P.O. Box 5592, Clark, NJ 07066-5592 (US).	
(30) Priority Data: 93027402 13 May 1993 (13.05.93) RU		(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, PL, RO, RU, SD, SE, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(71) Applicant (for all designated States except US): INVENTION MACHINE CORPORATION [US/US]; Suite 2a, 45 Trowbridge Street, Cambridge, MA 02138 (US).		Published <i>With international search report.</i> <i>With amended claims.</i>	
(72) Inventors; and (75) Inventors/Applicants (for US only): GERASIMOV, Vladimir M. [RU/RU]; 115-15 Polevaia Street, Metallostroy, St. Petersburg, 189631 (RU). LITVIN, Simeon S. [RU/RU]; 81-38 Malodetskoecky Avenue, St. Petersburg, 198147 (RU). ZAKHAROV, Alexey N. [RU/RU]; 111-22 Zavodskoy Avenue, Kolpino, St. Petersburg, 189630 (RU). LJUBOMIRSKY, Alexander L. [RU/RU]; 28-I-1 Tikhoretsky Avenue, St. Petersburg, 194064 (RU). PINIAEV, Alex M. [RU/RU]; 43-22/10 Marshal Govorov Street, St. Petersburg, 198097 (RU). GERASIMOV, Alexander N. [RU/RU]; 8-31 Pridorozhnaja Alley, St. Petersburg, 194292 (RU). POPENKER, Rudolf G. [RU/RU]; 81-4 Ikachey Street, St. Petersburg, 193029 (RU). GRIDNEV, Igor M. [RU/US];			
(54) Title: RAZOR BLADE UNIT			
(57) Abstract			
<p>A wet shaving head includes parts (6, 7) that define a cutting plane, a leading blade (2) mounted at an angle that is optimum for lifting before substantially cutting through the hair, and a trailing blade (3) mounted at an angle that is optimum for cutting a lifted hair without substantially further lifting it. The blades (2, 3) are arranged so that the trailing blade (3) begins to cut the hair before the leading blade (2) completes its cutting action on the lifted hair. The trailing blade (3) has its cutting edge mounted close to the cutting plane and the leading blade (2) has its cutting edge mounted at the same or greater distance from the cutting plane.</p> 			

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NR	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

RAZOR BLADE UNIT

This present invention relates to safety shaving apparatus and more particularly to a replaceable razor blade cartridge with two blades.

There are widespread safety shaving apparatus that consist of a handle component and a replaceable cartridge or head with two razor blades held therein. Such a replaceable head is manufactured by many firms and among there are "GILETTE TRAC II" (GILETTE COMPANY), "SCHICK ULTREX" (SCHICK), "F II" (Feather, Japan), "SPUTNIK II" (Consumer Goods Factory, St. Petersburg, Russia). In general, the design of the above-mentioned units is essentially defined by GILETTE patent, Great Britain, No. 1,362,443, a simplified design structure of which prior art razor blade unit is shown in FIG. 1.

The prior art shaving unit includes a base 1, a leading blade 2 and a following blade 3 with a space 4 between them and a cap member 5. Base 1 and cap member 5 have two supporting surfaces 6 and 7 correspondingly for contact with skin, and the cutting edges of the blades are disposed between these mentioned surfaces. The shaving unit razor blades 2

and 3 are disposed in parallel relation to one another and define an angle of about 20 to 25 degrees with the cutting plate or cutting plane between edges of supporting surfaces 6 and 7.

The safety of shaving is provided by presence of the supporting surfaces and the specific positioning of razor blades in the gap between the base and cap members.

Well-known modifications have been made to the shaving razor blade units shown in said British patent. For instance, to improve the cleaning in the gap between blades, a spring plate is placed in this gap to force out lather and debris, sometimes referred to as a "cleaning system" in well-known TRAC II, SCHICK, F II shaving razor blade units. To simplify the assembling procedure, shaving units can be made from two plastic parts with prepressed razor blades, or using standard razor blades. See, for example, U.S. Patent No. 4,852,254 and Former U.S.S.R. Certificate 1,481,061.

The integral coupling groove structure and the processes of assembly, materials and methods of machining are well developed, but no change has been made to the principal constructional scheme or principle of operation of the shaving unit that is shown in FIG. 1 which reflects the prior art to the present invention.

It is a main goal or theory of the prior art unit of Figure 1 to provide a close shave pursuant to the intended method shown in Figure 2. In Figure 2, the leading razor blade 2, while cutting, lifts the hair, completes the cut, leaving some part of the uncut hair above the cutting plate. At the next moment, this uncut hair portion is engaged and cut by the

following razor blade 3 (FIG. 2-B). After shaving, skin elasticity causes the cut hair to be pulled down, and as a result, the surface of skin is shaved closely.

But this intended method of Figure 2, in reality, is performed rather poorly because of the hair's downward movement before the following razor blade 3 can cut it, i.e., there is no cutting of the raised hair close to the skin surface. The enhancement of this action by reducing gap between blades will not lead to realization of the intended method because the space between blades fills quickly with lather and debris.

Also, real shaving quality improvement does not result from increasing of number of razor blades as shown in European Patent No. 0336355.

Moreover, the design of Figure 1 does not supply the optimum geometrical relationship between various components of the system that relates to shaving comfort because the razor blade mounting for effective pushing or pulling the hair upward, i.e., 25 degrees, is not effective for cutting the hair. Applicants hereof have determined that cutting is better achieved by razor blades mounting at the half of 20 to 25 degree cutting edge angle, i.e., about 11 degrees to the cutting plate for existing prior art razor blades.

To some extent, the angle of cutting can be changed by moving the shaving unit (swivel head). See European Patent No. 0132663. But in this prior art case, the quality of shaving remains the same as that of usual two blade shaving unit because the method of pulling or pushing up and cutting the hair remains the same as in Figure 2.

The engineering objective of the present invention is to develop a two-razor-blade shaving unit that provides a close and safe shave.

The objective result is achieved, in one exemplary embodiment of the present invention, by providing a shaving unit similar to that of Figure 1 comprising a base and a cap member, having supporting surfaces for contact with the skin and two razor blades between said base and said cap member. However, according to the present invention, said razor blades are mounted in such a manner so as to create by their plates or planes, at the zone of the cutting edges, an acute angle, and the leading razor blade is positioned toward the cutting plate not closer than the trailing blade.

The shaving principle of the present invention is that both razor blades, when mounted as stated above, act on the hair at the same time. The leading razor blade pushes or pulls up the hair and cuts it but not all the way through when the following razor blade begins to cut the hair completely close to the skin surface.

With this process, the razor blade mounting arrangement provides both the optimum angle for pulling up the hair by the leading razor blade and the optimum cutting angle for the following blade, thus providing both a close and a safe shave.

It should be understood that mounting razor blades according to the present invention enables them to be very close together to supply, on the one hand, the best conditions for simultaneously acting on the same cut hair, and out of danger, on the other hand, that the lather and debris will fill up the space between razor blades because such lather and debris will move to the expanding space between the blades.

The present invention principle can be seen by drawings in which:

FIG. 1 - prior art schematic construction.

FIG. 2 - intended scheme of hair-cutting process by prior art shaving unit.

FIG. 3 - scheme of the shaving process of one embodiment of the present invention.

FIG. 4 - one embodiment example of the present invention comprising one-sided razor blade shaving unit construction.

FIG. 5 and FIG. 6 - variants of present invention embodiments of double-sided razor blade shaving unit construction.

The shaving razor blade unit (FIG. 4) according to the principles of the present invention comprises base 1 and two razor blades - leading blade 2 and following blade 3, cap member 5. Base 1 and cap member 5 have supporting surfaces 6 and 7 corresponding to the tangent plate or cutting plate. The razor blades 2 and 3 are mounted at the acute angle one to another so the angle between leading razor blade plate or plane and the cutting plate is about 20 - 25 degrees, and the one between following razor blade plate or plane and the cutting plate is about 10 - 12 degrees. For supplying of the best conditions of above mentioned simultaneous activities on the pulled up and cut hair by both razor blades 2 and 3, the leading edge of razor blade 2 is positioned a distance from the cutting plane no less than the leading edge of blade 3.

The modified double-sided shaving unit (FIG. 5) according to the present invention comprises a base 1, two pairs of razor blades 2 and 3, cap member 5. Like a one-sided shaving unit (FIG. 4), in this variant, base 1 and cap member 5 have supporting surfaces 6 and 7 that create two cutting plates. Correspondingly, the razor blades 2 and 3 are mounted to create the cutting pairs like those of FIG. 4.

Shaving units in FIG. 5A and FIG. 5B show alternative embodiments of the inventive units of the double sided type. In FIG. 5A, the following razor blades 3 are mounted in the same plane but the leading razor blades 2 are mounted in two planes at an angle one to the other. In FIG. 5B, the leading razor blades 2 are mounted in one plane but the following razor blades 3 are mounted in two planes with an angle one to another.

It is possible to create double-sided shaving unit (FIG. 6) embodying the invention with two pairs of cutting razor blade edges 2 and 3 from only two strips of material for all leading razor blades 2 and for all following ones 3. In this case, double-edged blades are pressed or stressed into the shaving head so their planes, in the zone or area at cutting edges, create an angle mentioned above for the present invention in relation to cutting plate.

The assembling process of shaving heads according to the present invention can be the usual manufacturing of the standard shaving unit of Figure 1. The elements of the integral coupling groove structure of the head for cooperating with the handle can be the same as the known prior art products, for instance, fixed or pivoting type.

The technique or motion of wet shaving with the shaving unit of the present invention is the same as that of the prior art.

However, shaving with a unit according to principles of the present invention, including the simultaneous action on the cut hair by both razor blades as shown in FIG. 3, a close, safe and better shave is achieved.

It will be understood that various modifications and changes can be made to the herein disclosed exemplary embodiments of the present invention without departing from the spirit and sense thereof.

CLAIMS

Claim 1. A shaving head comprising first and second portions spaced from each other for engaging a user's skin and forming a cutting plane therewith,

 a leading blade and a following blade spaced from each other and mounted in a zone between said first and second portions,

 each of said blades having a cutting edge facing toward the forward direction and toward said cutting plane, said leading blade cutting edge forming a first acute angle with said cutting plane,

 said following blade cutting edge forming a second acute angle with said cutting plane,

 said first angle being greater than said second angle, and

 the leading blade cutting edge being spaced from said cutting plane a distance that is equal to or greater than the distance between the following blade cutting edge and the cutting plane.

Claim 2. A head according to claim 1, wherein the leading blade cutting edge is spaced forward of the following blade cutting edge a distance which enables the leading blade to engage and raise a hair and partially cut into the raised

hair at the moment the following blade engages and begins to cut the raised hair.

Claim 3. A head according to claim 1, wherein the following blade cutting edge is located relative to said cutting plane so that one of the surfaces of said following blade contacts the skin surface during forward travel.

Claim 4. A head according to claim 3, wherein the distance between said cutting plane and the cutting edge of said leading blade is greater than the distance between the following blade cutting edge and said cutting plane.

Claim 5. A head according to claim 1, wherein said first angle is selected to substantially optimize the raising of a hair before cutting the same.

Claim 6. A head according to claim 1 wherein said second angle is selected to substantially optimize the cutting through of a raised hair without substantially raising the same.

Claim 7. A head according to claim 1, wherein said second angle approximates one-half the value of the first angle.

Claim 8. A head according to claim 7, wherein said first angle approximates 20-25 degrees, and said second angle approximates 10-12 degrees.

Claim 9. A shaving head comprising first and second portions spaced from each other for engaging a user's skin and forming a cutting plane therewith,

a leading member mounted in the head for raising a hair, and

a following blade mounted in the head and having a cutting edge for cutting through the raised hair substantially at the cutting plane, said edge beginning the cutting of the raised hair while said leading member is applying raising forces on the hair.

Claim 10. A head according to claim 9, wherein said edge forms an angle with said cutting plane such that said blade cuts the raised hair without substantially raising the same further.

Claim 11. A head according to claim 9, wherein said cutting blade is mounted on the head such that its cutting edge travels substantially along said cutting plane.

AMENDED CLAIMS

[received by the International Bureau on 18 October 1994 (18.10.94);
original claims 1,2 and 9 amended;
remaining claims unchanged (2 pages)]

Claim 1. A shaving head comprising a part for engaging a user's skin and forming a cutting plane therewith,

 a leading blade and a following blade both mounted rearward of said part,

 each of said blades having a cutting edge spaced from the other cutting edge and facing toward the forward direction and toward said cutting plane,

 said cutting edges moving generally parallel to the cutting plane when said part is moved forward,

 said leading blade cutting edge forming a first acute angle with said cutting plane,

 said following blade cutting edge forming a second acute angle with said cutting plane,

 said first angle being greater than said second angle,
 the leading blade cutting edge being spaced from said cutting plane a distance that is equal to or greater than the distance between the following blade cutting edge and the cutting plane, and

 the spacing between said cutting edges enabling said cutting edges to simultaneously act on a hair during a same time segment during their forward movement.

Claim 2. A head according to claim 1, wherein the leading blade cutting edge is spaced forward of the following blade cutting edge a distance which enables the leading cutting edge to engage and raise a hair by its forward movement and no more than partially cut into the raised

Claim 9. A shaving head comprising a part for engaging a user's skin and forming a cutting plane therewith, a leading member mounted in the head rearward of said part and moving forward and generally parallel to said cutting plane when said part is moved forward, said member having a leading edge for raising a hair by engaging a portion of the hair located above the cutting plane and moving said portion generally parallel and forward as said member moves forward, and a following blade mounted in the head and having a cutting edge for cutting through the raised hair substantially at the cutting plane, said cutting edge beginning the cutting of the raised hair while said leading edge is applying raising forces on the hair.

Claim 10. A head according to claim 9, wherein said cutting edge forms an angle with said cutting plane such that said blade cuts the raised hair without substantially raising the same further.

Claim 11. A head according to claim 9, wherein said cutting blade is mounted on the head such that its cutting edge travels substantially along said cutting plane.

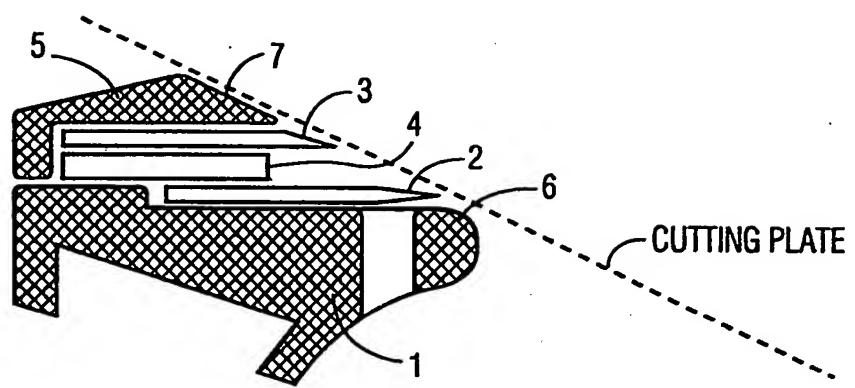


FIG. 1
PRIOR ART

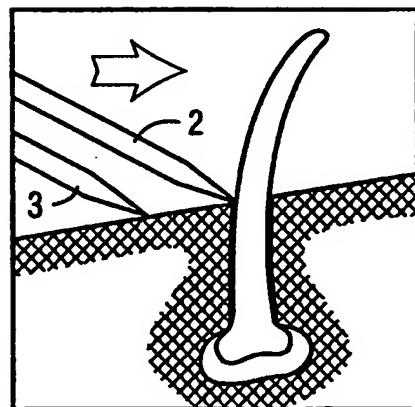


FIG. 2A
PRIOR ART

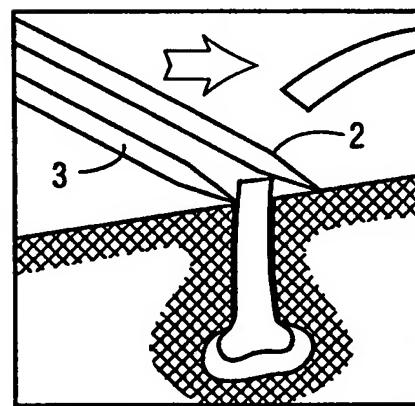


FIG. 2B
PRIOR ART

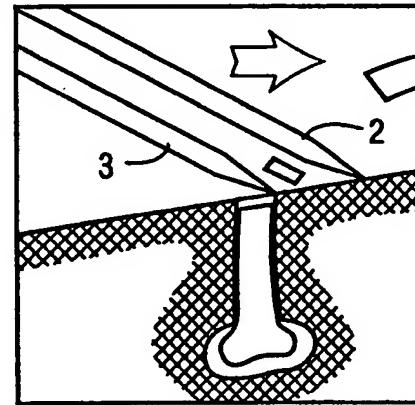


FIG. 2C
PRIOR ART

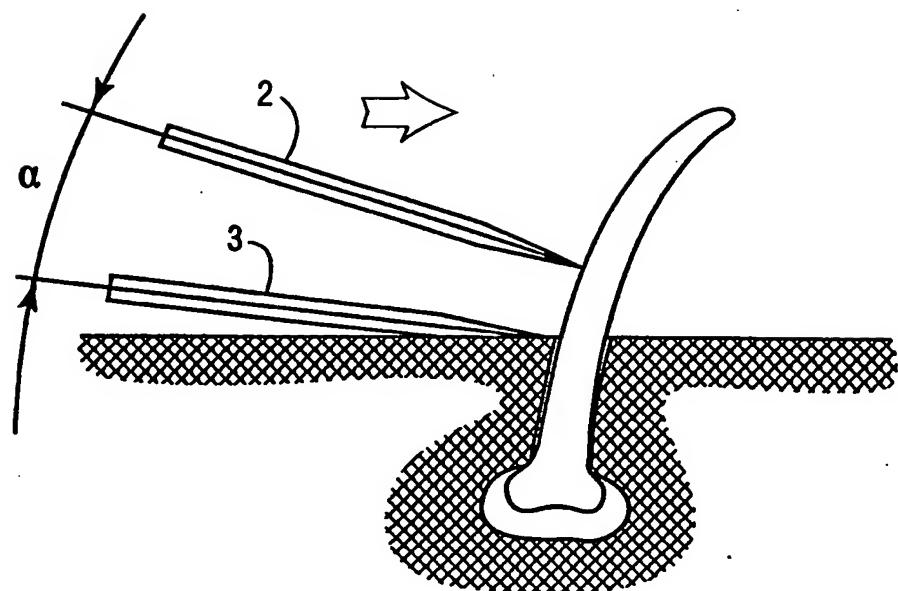


FIG. 3

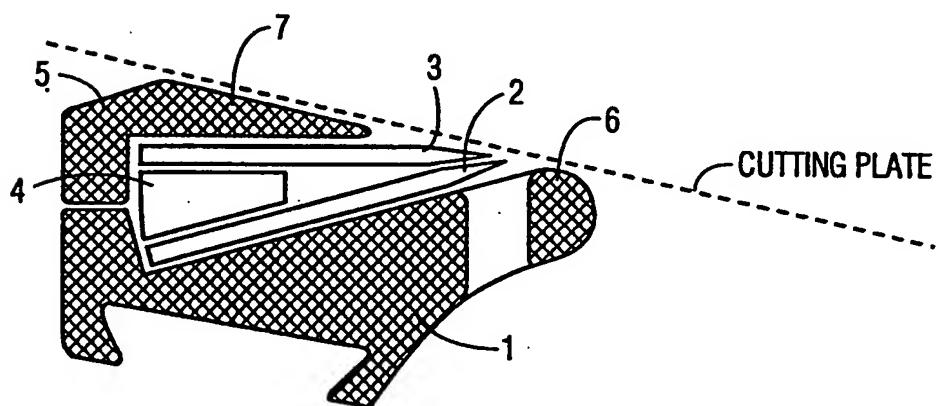
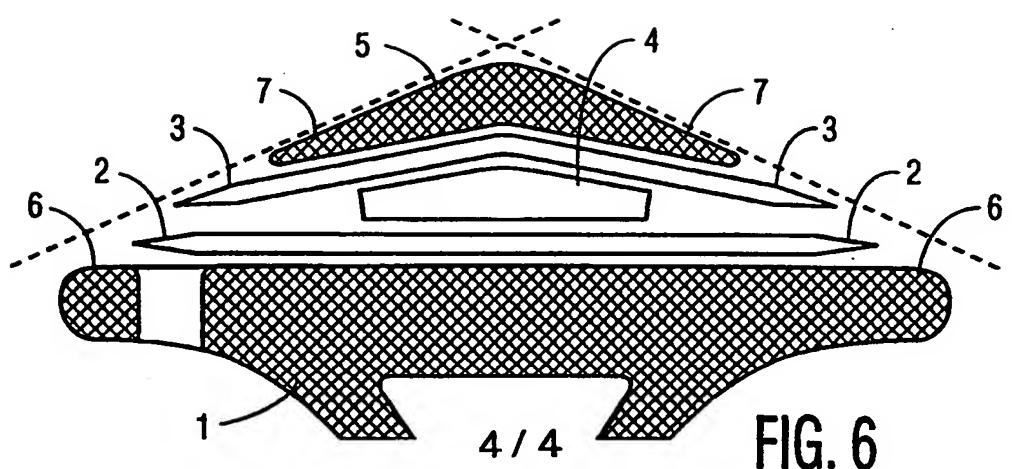
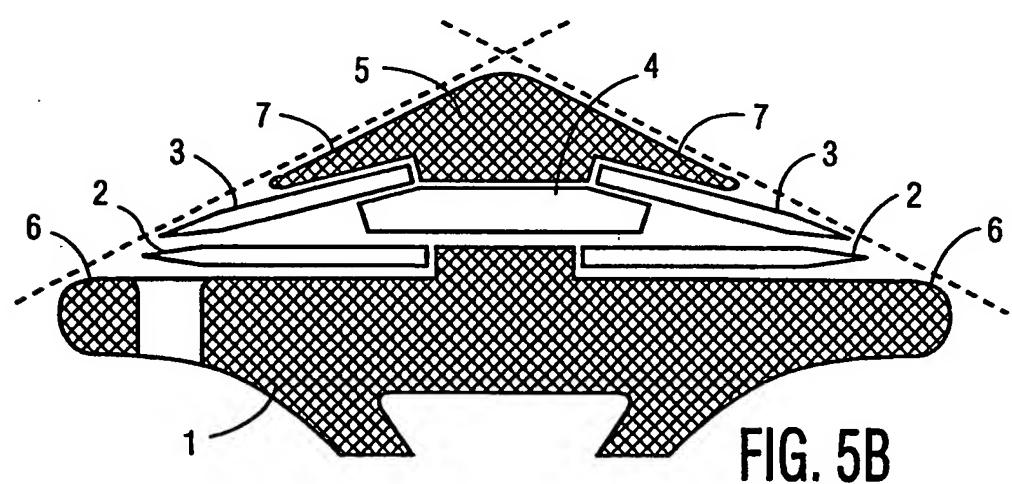
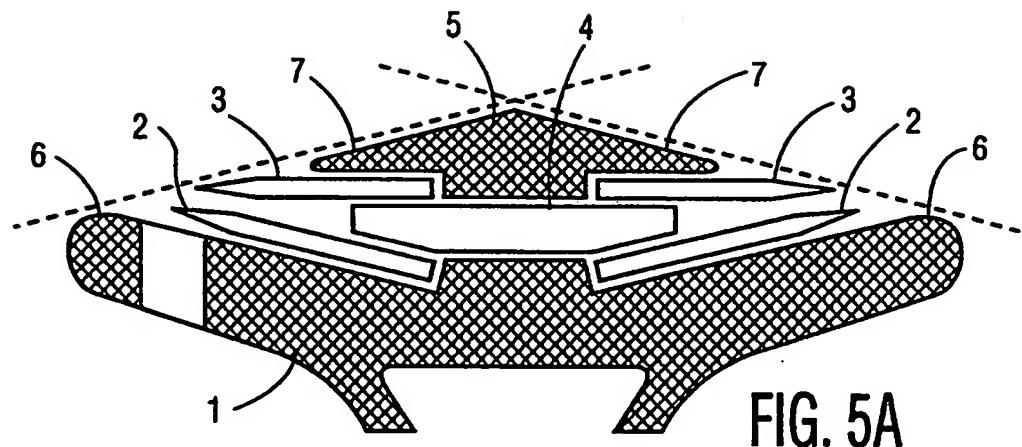


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US94/05238

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :B26B 21/00

US CL :30/34.2,50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 30/34.2,49,50

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 3,777,396 (SIMONETTI) 11 DECEMBER 1973, see Fig.5	1-11
X	US, A, 4,044,463 (TIETJENS) 30 AUGUST 1977, see the entire document	9-11
X	DD, A, 853,397 (FIEBELKORN) 08 JULY 1949, see Fig.2	1-7 and 9-11
A	US, A, 4,407,067 (TROTTA) 04 OCTOBER 1983, see Figs. 10-12	1

Further documents are listed in the continuation of Box C.

See patent family annex.

•	Special categories of cited documents:	
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier document published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

09 AUGUST 1994

Date of mailing of the international search report

AUG 19 1994

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

Richard Seidel

Telephone No. (703)308-1148

Joni Bell